

VESSEL PARTICULARS (FORM C)
LPG/C GAS ASTRID
(last updated 8/12/2010)

Specifications of the vessel and the gas installation which are representations by the Owners.

(A) VESSEL'S CHARACTERISTICS

PREAMBLE

Name : **GAS ASTRID**
 Owner : **SOUND EFFEX INC.**
 Flag : **MARSHAL ISLANDS**
 Build : **KANREI SHIPBUILDING CO. LTD., JAPAN**
 Date on Service : **April 15, 2009**
 Class : **BUREAU VERITAS (BV)**

GRT International : **2,997 ton** Suez : **3,395.45 ton**
 Panama : **10,683 m3**

NRT International : **951 ton** Suez : **2,822.57 ton**
 Panama : **2,574 ton**

Is vessel build according to USCG regulations? : **YES**
 RINA regulations? : **N/A**
 Japanese regulation? : **YES (JIS)**

Has vessel received USCG approval? : **YES (for foreign vessel in US water)**
 RINA approval? : **N/A**

HULL

LOA : **96.00 M**
 LBP : **89.50 M**
 Breadth : **15.00 M**
 Depth : **7.00 M**
 Summer Draft : **5.50 M corresponding to Summer DWT = 3,102.82 t**
 Multiple Draft : **5.409 M corresponding to Multiple DWT = 2,999.00 t**

Estimated draft with full cargo and full bunkers are as follows.

Product	Draft Fore' (m)	Draft Aft' (m)	Draft Mean (m)	Corresponding Deadweight (t)
Propane (98%)	4.42	6.24	5.33	2,952.29
Butadiene (98%)	4.50	6.29	5.40	3,031.20
VCM (98%)	4.22	6.65	5.44	3,102.82

Propeller immersion :

At draft At **6.24 m correspond.** : **134.67 %**
 At draft At **6.29 m correspond.** : **136.33 %**
 At draft At **6.65 m correspond.** : **148.33 %**

COMMUNICATION EQUIPMENT

Call letter : **V7RK7**
Radio Station normally watched : **GMDSS (MF/HF-NBDP/VHF-DSC)**
Radio MF/HF NBDP : **YES**
Radio MF/HFTEL/DSC : **YES**
VHF : **YES**
Satellite Communication **Inmarsat 'C'** : **453834041**
Inmarsat 'F' : **(Tel) 764805537/38**
: **(Fax) 764805539**
: **(E-mail) gasastrid@stealth.gr**

MACHINERY

Main Engine x 1 . Type and make : **DIESEL ENGINE HANSHIN LH41LA
THE HANSHIN DIESEL WORKS, LTD.**
. Service power : **2,647KW at 240 RPM**
No of Cylinders **6**
Cyl Bore x Stroke **410mm X 800mm**
. Grade of fuel used : **HFO having a viscosity of not more than 380cst
@50 °C**

Auxiliaries Type and make (Electrical) **YANMAR 6NY16L-UN Vertical, trunk, piston In-line
NTAKL-VEK (brushless excitation system) 400KVA
450V / 514A**
(Mechanical) **355 KW X 1,200 RPM**
Grade of fuel used **Diesel Oil - 6 Cst at 40°C**
No off **2**

Emergency Gen Type **STB-WE10 (Sanshin115V-1800RPM-60Hz/1 Phase)**
No off **1**

Bow Thruster Type : Power: **N/A**

Boiler Type **VWH-600E Miura Natural Circulation Vertical
Water -Tube Boiler**
Evaporation **538 kg/Hr**
Max Design **0.7 MPa**
Pressure
Feed Water Temp **60°C**
No off **1**

Exhaust Economiser Type **KF-65F Miura Exhaust Gas**
Evaporation **400 kg/Hr**
No off **1**

Air Compressors (Main) Type / Capacity **MS92A (Vertical 2-Stage water cooled
32.5 m3/hr (Matsubara)**
No off **2**

Air Compressors (Emergency) Type **Diesel Driven, L Type Air, Cooled, 2 Stages
6.0 m3/hr (Sanwa)**
No off **1**

Fuel Oil Purifier Type **Mitsubishi SJ20G - Centrifugal**
No off **2**

	Capacity	800 Ltrs / Hr at 98°C
Lub Oil Purifier	Type	Mitsubishi SJ20G - Centrifugal
	No off	1
	Capacity	1,650 Ltrs / Hr at 95°C
Evaporator	Type	Miura Protec Co., Ltd (WM-10SS) – Waste heat recovery
	Capacity	1 x 10 t/day
Fresh Water Sterilizer	Type	Uzushio Electric Co., Ltd (USS-2K) – Electric Ultra Violet lamp with filter
	Capacity	1 x2,000 litre/h
Fresh Water Mineraliser	Type / Capacity	1 x 1000 litre/h / Nippon Controls Co Ltd (RF-1000S) – Vertical. Welded stainless steel
Waste Oil Incinerator (IMO MEPC 76 (40))	Type	Miura Protec Co Ltd (BGW-20N - Horizontal air atomizing type with aux burner
	Capacity	Oil @ 24.3 lit/h & Solids @ 20 Kg/h
Oily Water Separator	Type	Taiko Kikai Industries Co, Ltd (USH-10) – automatic oil discharge type
	Capacity	1 x 1.0 m3/h
Sewage Treatment plant	Type	Taiko Kikai Industries Co, Ltd (SBT-25) Activated sludge aeration (Biological) – USCG certified
	Capacity	1 x 25 persons per day
	No off	1
Hot Water Set Calorifier unit)	Type	Harison Co Ltd (CFT-400-E)
	Capacity	400L tank with 2 x 10Kw heaters (1 Stby) / 1 set
Steering Gear	Type	Electro-Hydraulic system with 2-pump units (dual system) – (one pump to be able to supply full power)
	Duty Capacity	13.0 t-m
	Hydraulic pump unit	Electric motor driven, 2 x 3.7 Kw

Speed

UP TO BEAUFORT SCALE 4, DOUGLAS SEA 3

About: Ballast Abt 13.50 knots / Laden Abt 13.00 knots

CONSUMPTION/ DAY

		AT SEA	AT PORT
Main Engine	HFO	Ballast Condition – 10.50 mt/day Ladden Condition – 11.00 mt/day	NIL
Auxiliary Engine	DO	1 Generator abt. 1.00 mt/day 2 Generators abt. 1.80 mts/day PLUS 1.0MT WHEN INERTING	IDLE / LOADING abt. 1.50 mt/day DISCH. abt.2.00 mts/day PLUS 1.0MT WHEN INERTING

Permanent bunker
capacity (100%)

HFO : 380.22 m3
Diesel : 101.14 m3
Fresh Water : 221.46 m3

(B) CARGO INSTALLATIONS

1. Transportable products and respective quantities, calculated in accordance with IMO – maximum filling formula. (Tonnes)

	100% (CBM)	98% (CBM)		
NO.1 CARGO TANK	1,756.646	1,721.513		
NO.2 CARGO TANK	1,756.898	1,721.760		
TOTAL	3,513.544	3,443.273		
	SPSV (bar g)	Ref. Temp. (deg. C.)	Density at (Ref. Temp.)	Corresponding Quantity (MT)
Propane	17.65	45.0	0.459	1580.462
Propylene	17.65	45.0	0.470	1618.338
B/P Mixture	17.65	45.0	0.487	1676.874
I-Butane	17.65	45.0	0.526	1811.162
N-Butane	17.65	45.0	0.548	1886.914
Butylene	17.65	45.0	0.565	1945.449
Butadiene	17.65	45.0	0.588	2024.645
V.C.M.	17.65	45.0	0.872	3002.534
Isoprene	17.65	45.0	0.656	2258.787
Pentane	17.65	45.0	0.600	2065.964
Pentene	17.65	45.0	0.611	2103.840

Note(1): In case of USCG, propylene, propane and B/P mixtures are not to be carried except the vapour pressure of B/P mixtures is not more than 12.75 bar g, 13.0 kg/cm² @ 45 °C

Note(2): On and after, the pressure value in parentheses is shown as a conversion value

Mixing ratio of above mentioned B/P mixtures is as follows:

Butane 35 wt% and propane 65 wt%

2. Other transportable products N/A

	SPSV	Ref. Temp. (°C.)	Density at Ref. Temp.	Corresponding Quantity (MT)
Raffinate 1	TBA	TBA	TBA	TBA
Raffinate 2	TBA	TBA	TBA	TBA
C4	TBA	TBA	TBA	TBA

3. TANKS

- 3.1 Design pressure (Vapour) – BV-IGC : 17.65 bar g (1.765 MPag)
- USCG : 12.75 bar g (1.275 MPag)
- 3.2 Valve setting : 17.65 bar g (1.765 MPag) / 12.75 bar g (1.275 MPag)
- 3.3 Maximum vacuum obtainable : Atmospheric
- 3.5 Maximum temperature acceptable : 45 °C
- 3.6 Minimum temperature acceptable : 0 °C
- 3.7 Hydrostatic Test Pressure : 26.48 bar g (2.648 MPag)

4. LOADING RATE (TONS/HOUR) – For Full Cargo Parcels

Ex-atmospheric storage with gas : 1 tank : about 410 m³ per hour for LPG
about 250 m³ per hour for VCM

Return 2 tanks : **about 730 m³ per hour for LPG**
about 450 m³ per hour for VCM

Remarks:

* Based on maximum velocity of 6.5 metres/sec except VCM, and 4.0 meters/sec for VCM in the liquid piping.

* If cargo temperature is less than 0 °C, shore heater to be used. If ship heater used, max rate is **250 m³** per hour.

* Loading by shore pump only, proper size gas return line to be connected

* Subject to both ship and shore tanks being under favourable conditions

5. CARGO PUMPS

- 5.1 Type : **Deep-well type of vertical centrifugal multistage Design with Inducer**
Make : **HAMWORTHY KSE SVANEHOJ A/S**
How many : **1 Set each Tank (Total 2 sets)**
Maximum specific gravity : **0.601 (LPG) 0.948 (VCM)**
- 5.2 Capacity (CMB/Hour) : **300 m³/Hr at RD of 0.611 (LPG)**
250 m³/hr at RD of 0.948 (VCM)
Two speed or variable speed : **SINGLE SPEED**
Rated kW (each) : **130 KW**
Working pressure maximum : **20 Bar G**
- 5.3 Location : **At each Cargo Tank**
Removable : **Yes**
- 5.4 Booster pumps : **N/A**
Type : **N/A**
Maker : **N/A**
- 5.5 Capacity (CMB/Hour) : **N/A**
Working pressure : **N/A**
- 5.6 Location : **N/A**
- 5.7 Time to discharge a full liquid cargo using all pumps against back pressure at pump
1 bar : **about 14 hours for LPG**
5 bars : **about 47 hours for LPG**
10 bars : **-----**
- 5.8 Nominal back pressure when working : **about 1 bar**
In series corresponding head : **N/A**
Maximum back pressure : **about 5 bar**
Nominal pressure at rail (propane) : **about 13 bar at 20 degree C of cargo temperature**
- 5.9 What amount of cargo remains in tanks after completion pumping before stripping:
- liquid : **about 1.2 m³ per one tank**
- vapour : **about 30 ton per one tank for LPG**

6. STRIPPING

- 6.1 Stripping system, if any : **N/A**
- 6.2 Time required to remove all traces of liquid cargo as stated in 5.9 for:
- LPG : **about 2.0 hours**

7. CARGO COMPRESSORS

- 7.1 Type : **VERTICAL 1 STAGE WATER COOLED DOUBLE ACTION**
Make : **TANABE PNEUMATIC MACHINERY. CO., LTD**
How many : **2 SETS**
Piston displacement : **460 M3/HR**
Rated Kw : **75 KW**
Stroke : **177.8 mm**
Max discharge pressure : **20.0 Bar G**
Pressure differential : **4.0 Bar G (Normal)**
7.0 Bar G (Maximum at Single Action)
No of Revolutions : **540 RPM**
- 7.2 Are compressors oil free : **YES**
- 7.3 Can they reliquify VCM without risk : **N/A**
- 7.4 State time to bring full cargo of butane to atmospheric pressure from : **N/A**

8. INERT GAS SYSTEM

- 8.1 Does the vessel use inert gas? : **YES**
If so, state utilization and quantities : **NITROGEN AS PER BELOW CAPACITIES**

OXYGEN: 1.0% to 0.05%

- Discharge Capacity : **TBA**
- 8.2 Can the vessel produce inert gas? : **YES**
If so, state type and composition of gas produce: **NITROGEN**
Discharge Capacity : **245 m3/h @ 97.00% N2**
200 m3/h @ 99.00% N2
130 m3/h @ 99.90% N2
- 8.3 Maximum production obtainable : **245 M3/H**
NOTE:- Above quantities obtained at engine room temperature 45° C
- 8.4 State if there are storage facilities for inert gas onboard: **N/A**
- Size : **N/A**
- Pressure : **N/A**
- 8.5 State if any shore supply of nitrogen may be required: : **N/A**
- for what purpose : **N/A**
- what quantities : **N/A**

9. GAS FREEING

- 9.1 State method used giving all details : **Nitrogen Plant / Fans**
- 9.2 State time required including stripping : **TBA**

10. CHANGING GRADE

- 10.1 From completion discharge of cargo Propane, time required in hours and inert gas in CBM required to reach a tank and gas installation atmosphere of less than 100 ppm of Propane in Vapour phase.
Time required: TBA
- 10.2 Can this operation be carried out at sea? : **YES (Preferably Calm)**
- 10.3 Can the ship measure the number of ppm in vapour phase? : **YES**

10.4 Has vessel deck tank for changing grade/cooling operations? : **NO**

10.5 Deck tanks : **N/A**
Capacity : **N/A**
Purpose : **N/A**

11. COOLING BEFORE LOADING : **N/A**

12. CARGO HEATER

12.1 Type : **Horizontal, Shell and Tube, Class I.P.V.
(ME4B-3-G-S-FD)**
12.2 Inside Diameter **700 mm**
12.3 Overall length **7500 mm**
12.4 Cargo flow rate **250 m3 (Propane)**
12.5 Min Inlet Temp **- 48°C**
12.6 Min Outlet Temp **0.0 °C**
12.7 Required Sea water Capacity **450 m3/h (Min 16°C)**
12.8 Design Pressure **20.0 Bar G**
12.9 Hydrostatic Test Pressure **30.0 Bar G**
12.10 Tightness Test Pressure **20.0 Bar G**

12.0 State discharging rate for propane to be brought from atmospheric pressure
Loading rate for Propane – minus 42° C / 0° C: **about 145 Mt/hr**

13. CARGO VAPORIZER

In case vapour gas is needed to feed compressors, can vessel produce its own if no shore available:

No

14. REFRIGERATING APPARATUS **NA**

14.1 Is it independent of cargo? : **NA**
Is so, state cooling agents : **NA**

14.2 What minimum temperature can be maintained : **NA**

14.3 What time required at sea to lower by 1°C the full cargo of : **NA**

15. MEASURING APPARATUS

What gauges on board?

Type : **Float type level gauge**
Location : **At each cargo tank dome**

16. SAMPLES

16.1 State how tank atmosphere samples can be taken and where from?
3 Sampling Nozzle at the top of Tank Dome (Top, Middle, Bottom)

Standard of fitting? : **JIS PT1/2 thread**

16.2 Same question for cargo : **Same answer on 16.1 plus
1 Sampling Nozzle at pressure gauge branch
at the discharge Lien of cargo pump.
JIS 3/8 thread**

16.3 Are sample bottles available on board? : **No**

17. CARGO LINES

- 17.1 Is ship fitted with a port and starboard cargo manifold? : **Yes**
- 17.2 Position of cargo manifold
- distance from stern (AP) (S / P) : **50.95 M**
 - distance form stem (FP) (S / P) : **42.65 M**
 - height above deck : **1.10 m for Liquid manifold**
 - distance from ship's rail : **2.30 M**
 - underside keel to manifold : **8.20 M**
- 17.3 Liquid line
- flange-size : **8 in.**
 - type : **ANSI300LB RF**
- Gas line
- flange-size : **5 in.**
 - type : **ANSI300LB RF**
- 17.4 What reducers on board? : **20 carbon steel**
- For Liquid line (low temperature)**
- 10" ANSI 300LB, 6" ANSI 300LB, 5" ANSI 300LB
4" ANSI 300LB, 3" ANSI 300LB
8" ANSI 150LB, 6" ANSI 150LB, 4" ANSI 150LB
8" JIS20K, 6" JIS20K, 4" JIS20K**
- For Vapor line (normal temp.)**
- 4" ANSI 300LB, 3" ANSI 300LB, 2" ANSI 300LB
6" ANSI 150LB, 5" ANSI 150LB, 3" ANSI 150LB
2" ANSI 150LB
5" JIS20K, 4" JIS20K**
- 17.5 Is ship fitted with stern discharge? **No**
- Liquid line - diameter : **N/A**
 - flange – size : **N/A**
 - type : **N/A**

18. HOSES

- Are serviceable hoses available on board? : **None**
- 18.1
- Length : **TBA-Owner**
 - Diameter : **TBA-Owner**
 - Flange-size : **TBA-Owner**
 - Type : **TBA-Owner**
 - Bending radius : **TBA-Owner**
- 18.2 Minimum temperature acceptable : **TBA-Owner**
- Maximum pressure acceptable : **TBA-Owner**
- 18.3 For what products are hoses suitable? : **TBA-Owner**

19. DERRICKS

- Hose cranes : **1 SET**
- Where situated : **Mid-Ship Area in between Cargo Tanks 1 and 2**
- Lifting capacity : **4.0 T @ 10m/min**
- Working radius : **15.0 M**

20. SPECIAL FACILITIES

- 20.1 How many grades can be segregated? : **SINGLE GRADE ONLY**
- 20.2 How many cooled? : **N/A**

20.3 Can vessel sail with slack cargo tanks? : **YES**